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XXIV. ACCOUNT

OF FOSSIL SHELLS, WITH THE AUTHOR'S REASONS FOR ATTENDING TO THE SAME;

In a letter to Levi Hedge, F. A. A.

By PARKER CLEAVELAND, A. M.

Professor of Mathematics and Natural Philosophy in Bowdoin College.

Bowdoin College, 10 *October*, 1808.

DEAR SIR,

AT your request I transmit you an account of the fossil shells, which you saw in my possession, when I had the pleasure of your visit at Brunswick. Previous however to a relation of the particulars, I will take the liberty of mentioning the reasons, which have induced me to pay attention to facts of so common occurrence.

The universal existence of marine shells and other fossil bodies, at considerable depths below the surface of the earth, satisfactorily prove that very great changes have taken place in the exterior parts of our globe, either by sudden and powerful convulsions, or in some more gradual manner. In every system of geology fossil bodies have deservedly received a large share of attention; and it is perhaps true, that further discoveries of fossil shells on mountains and in very elevated situations, under circumstances precisely similar to those, in which they have been found, would afford very little assistance in forming more correct geological systems. But with regard to the discovery of shells in plains and small elevations near the sea, the preceding remark may not be true. Concerning these it may be inquired, whether the changes, to which the shells owe their existence as fossils, be of ancient or modern date; whether they were produced by great convulsions and sudden inundations, or by gradual alterations of many successive years. It has been suggested that important advantages would result from possessing a geographical map, indicating the different species of fossil shells, and the places, in which they were found. I think the idea important, and practicable at least with regard to any country or coast, which may be thickly inhabited. With such a map before us we should be better enabled to compare individual facts, and hence to draw several conclusions. Under this view of the subject the discovery of shells, which are merely fluviatile, will be worthy of attention. For the preceding reasons I have endeavoured to collect all the facts in my power. I will now give you a description of two wells, which I have examined the last summer, while digging.

One is in Bowdoin, at the distance of three or four miles from the nearest salt water, which is at the termination of the tide in Cathance river; the distance of the well from the sea is probably about twenty miles. Its elevation above the tide in Cathance river is estimated by gentlemen, living in that part of the country, at seventy or eighty feet. The land about the well is very uneven, and abounds with gneiss and a coarse granite. A small stream passes about fifty rods from the well; and, after a long and winding course, assists in forming the Cathance. This well is twenty feet deep. Through the first ten feet from the surface a hard gravel is found, stratified and interspersed with layers of coarse, yellowish sand. At the depth of ten feet commences a stratum of blue clay, into which the workmen dug ten feet, but without passing through the clay. When first taken from the ground, it is nearly black, and very tenacious. This clay both in appearance and smell resembles that dug on flats, or near salt marshes, or on the margin of salt water rivers. The shells also have the same smell, when first taken from the clay; and, as far as I have seen, are the clam, and two varieties of the muscle; and another kind of shell, whose genus I know not. It is large, of a conical form, about three inches in length, and passing in a double spiral line from the larger part to the vertex. The same genus is found on our sea shores. These shells are in general well preserved, and in almost every instance filled with clay; which must have entered them with the water, in which it was suspended. I saw very few valves lying by themselves. When carefully taken from the clay, the shell is either whole, or the valves opened and lying contiguous to each other at the hinge. I also took from near the bottom of the same well a large rock, to which were adhering many of those shells, which the seamen call barnacles.

The other well is situated in Brunswick; at an elevation of about eighty feet above the tide water in the Androscoggin; and about half a mile westward of the same river above the falls. It is on the side of a hill. Several gullies take their rise at the foot of the hill, and lead to the river. This well is twenty two feet deep. After cutting through the soil, the first twelve feet consist of alternate strata of yellowish sand and common brick clay. At the depth of twelve feet commences a stratum of blue clay, which is four feet thick. This clay is plentifully interspersed with shells, similar to those before mentioned; and has the same appearance and smell. This is followed by a stratum of grey sand, similar to that often seen upon beaches. The next three feet consist of thin, alternate layers of common brick clay and a reddish sand. The last stratum, and that, in which the well terminates, is a brown sand, resembling that, which is frequently found at the surface.

I have selected these two wells from several others, because I had better opportunities of examining them.

I have a few specimens, which I should be happy in sending you, were the opportunity convenient.

I am, dear sir,
you friend &c.
PARKER CLEAVELAND.